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NEPHRITIS IN ITS SURGICAL ASPECTS.[1]

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PART I.—INTRODUCTORY.

So many inflammations of the kidney have a surgical side that I must define the limits of my subject. I shall speak only of suppurative pyelonephritis, that common malady sometimes called "the surgical kidney," and I shall consider it both as it occurs spontaneously and as a complication of vesical disorder, the drift of my discussion to be a consideration of etiology and of the practical means of preventing the malady.

The subject, though well worn, is not threadbare. Investigators are still struggling with its problems, although much light has been already thrown into its dark corners—light which is reflected in the routine methods of the practical surgeon of to-day, enabling him to conduct his patient more safely past points of danger than was in any way possible a few years ago.

Much of this light emanates from laboratorial researches carried on abroad—notably in France, under the inspiration of Guyon—and from these researches I must borrow largely in introducing my subject.

It has been contended that the name "surgical kidney" is a misnomer (C. Lucas), since its existence is often due to the lack of intelligent surgery, and that it would be as logical to name a riot a "policeman's mob," because it was due to the absence of that enforcer of the law; but

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the distinction is captious. The term may well remain, since the surgical kidney is a complication for the most part of surgical disorder, and its study within the domain of surgical pathology.

Modern demonstration shows in a manner which the logical mind must accept that suppuration in the kidney, as elsewhere, is associated with the existence of micro-organisms, and due directly to their presence. Yet a distinction is here necessary, as it is, for instance, in the contemplation of contagious disorders, for the production of which, as Bouchard aptly puts it, something more is necessary than the accidental encounter of a man and a microbe; the soil must be suitable, the conditions must be favorable, or the seed does not take root.

I cannot discuss the controversial aspect of microbic infection, as this paper aims at being practical, but must ask you to accept, what wide demonstration at many hands has proved, that without the co-operation of microbic infection there is no suppuration in the urinary passages.

Since Pasteur opened the subject in 1859—less than a lifetime ago—by noticing that boiled urine remained sweet, while dust brought decomposition to it, and, with Van Tieghem, fastened the blame upon what he called "torules ammoniacales," all through the line of Traube, Cohn, Fels and Ritter, Hiller, Niemeyer, Klebs, Lister, Lancereaux, Lepine, Roux, Albarran, Hallé, Krögius, Schnitzler, Rovsing, Clado, Chabrié, Escherich, Morell, Achard, Renant, Reblaud, Guyon, and a host of others, the demonstration has been progressive, and no escape has been possible from the flat conclusion: In the urinary tract, no microbes no suppuration. The protest of Enriquez is by the way, together with that of Manotti and Bachiocchi and others—for that even normal urine may contain germs, and that the kidney may eliminate such, without the necessity of accompanying renal inflammation, may be granted; we have only to revert to Bouchard's aphorism of the man and the microbe: The seed may be old, it may be unsuitable; the soil may not be ready; surely every man in an epidemic does not acquire disease.

The healthy urethra is well known to be the habitual residence of numerous micro-organisms, some of them pathogenic, just as the external integument is; yet they cause no disease under normal conditions. So much at home are they, indeed, and so intimately bedded among the cells and in the ducts of the mucous glands, that no amount of prolonged irrigation with hot water, boric acid, or even 1 in 1000 nitrate of silver solution at the hands of Petit and Wassermann could succeed in rendering this membrane sterile; inoculation of its mucus (after irrigation) in bouillon tubes always gave positive results.

This, at least not aseptic, condition of the urethral mucous membrane stops in health at the cut-off muscle. Beyond and above all is pure, and Guyon with his pupils, as well as others, have amply demonstrated that urine taken aseptically from the bladder is sterile.

How and why, then, in cases of suppuration does it become contaminated?

The *How* is clearly by way of the introduction of micro-organisms, either by (1) propagation along the mucous surface by reason of local damage to the deep urethral membrane [tubercle, cancer, stone, bruising violence, erotic excitement, gonorrhœa, gouty congestion, enlarged prostate—or spontaneously]; (2) introduction by the surgeon upon his instruments; (3) bursting into the urinary tract of some extraneous focus of suppuration; (4) transmission through the unbroken tissues from a neighboring focus—it has been even alleged that the bacterium coli commune may get through from the rectum and do its work upon the mucous membrane of a bladder ready to receive it (5) by descent from the blood downward through the kidney—but this, except the wedge-shaped pyæmic foci, is very uncommon, and, as in Bouchard's suppurative nephritis occurring during the course of a general infectious malady, the suppuration commencing in the kidney, usually remains there and does not descend into the bladder.[1]

I cannot halt here to discuss these various alleged methods of invasion, but pass on to the more important *Why?*

Why do micro-organisms produce suppuration in some instances and not in others? This opens the question of preparation of the soil.

As early as 1873 Fels and Ritter, by inoculating the bladders of dogs, produced ammoniacal urine and cystitis—but only on condition of ligating the urethra. Upon loosening this ligature the bladder promptly resumed its condition of health. So Guyon, Albarran, Guiard, and many others, introducing pure cultures of micro-organisms into the healthy bladders of animals, fail to set up cystitis unless to the microbic germ there be added other factors, such as ligating the urethra to produce forced retention, or wounding the bladder. Certain micro-organisms have proved themselves more virulent than others, just as certain subjects are exceptionably susceptible, and Schnitzler claims that with the "urobacillus liquefaciens septicus" he can produce cystitis without tying the urethra. This urobacillus is now believed to be identical with the bacterium coli commune; more evidence is therefore needed. Barlow has recently contributed some testimony on this point.

But Guyon, Petersen, Albarran, and many others have repeatedly proved that retention, ligating the urethra, trauma—not one of these causes alone will produce cystitis, and that anyone of them plus the proper germ will do it. Straus and Germont clearly proved that simple ligature of the ureter, aseptically performed, does not occasion inflammation of the kidney, but produces dilatation, and then atrophy; while Charcot and Gombault, with equal clearness, have demonstrated that septic ligation of the ureter does produce the suppurating kidney.

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[1] Albarran has produced descending pyelitis experimentally.

That trauma prepares a soil for microbic infection is beautifully illustrated by Albarran. He showed that the blood might be a channel of infection by inoculating one ureter and ligating it below; then finding both kidneys implicated, as being spots "minoris resistentiæ"—the ligated side because of congestion and of direct infection, the other on account of its hyperactivity from having had double work to do. Then Albarran injected his bacterium pyogenes directly into a bloodvessel in a number of animals, and got plenty of embolic abscesses in every instance, but found the kidneys free in all save one. To study the effect of injury plus germs, he therefore contused one kidney in a rabbit and injected a pure bouillon culture of bacterium pyogenes into its ear. The next day this kidney was already in commencing suppuration. He produced nephritis also by injecting the ureter (and ligating) with streptococcus pyogenes, and with staphylococcus aureus as well.

Indeed, how many kinds of germs there may be capable of setting up suppurative nephritis, I do not know. That there are a number seems certain; but there still exists confusion among authorities, and the last word has not been spoken. Nor is the method of action quite agreed upon, Rovsing believing that ammoniacal fermentation of urine is a factor of prime importance, while Guyon upholds that this feature is secondary. That it is not always essential is shown by the fact that there is such a thing as acid cystitis. Uncomplicated tubercular cystitis is an example in point.

As for the single germ named by investigators seeming to have the most pernicious qualities, it appears to be growing more and more clear that this germ is the bacterium coli commune,[1] a bacillus similar to, if not identical with that commonly found in the colon under all circumstances.

This it seems is the same as the urobacillus septicus, and as the septic bacterium discovered by Bouchard in 1879, by Clado and by Hallé in 1887, studied intimately in 1888 by Albarran and Hallé, and by Albarran in 1889 as the bacterium pyogenes, by Rovsing in 1889 as the coccobacillus ureæ pyogenes, by Chabrié in 1892 as the uro-bacillus non-liquefaciens septicus, by Morell as the bacterium lactis ærogenes, by Krögius, Achard and Renant, Reblaud, etc.; all these seem to be the same time-honored bacterium coli commune. This germ is most often found in bad cases. Associated with it, or alone, may be found also the staphylococcus pyogenes aureus and the streptococcus pyogenes.

Accepting then, from experimental data, that suppurative inflammation along the urinary tract demands for its production, first, a microorganism; second, a soil properly prepared by overdistention, congestion, or trauma, let us next turn to the clinical side of the picture, and see whether the same conditions obtain.

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[1] 4 to 6μ long, 2μ broad, with rounded ends; staining by Weigert's method.

Surely they do. The young and vigorous bladder and kidney do not suppurate except for trauma—injury, stone, tumor, stricture, gonococcus, tubercle; in weakly young subjects they do suppurate when depressed nerve force and atony of the circulation, or intense congestion from repeated erotic cause, may be presumed to prepare the way through the congestive process. We all know with what liberty young subjects may be handled instrumentally. The slight disturbance following sounding or catheterism quickly subsides; urethral fever and surgical kidney are here almost unknown.

Again, in youth and vigorous manhood, when the bladder is strong and capable of emptying itself, when there is no atony—in cases of retention from fever, coma, spasmodic stricture, with what carelessness the catheter may be used, and no evil result follow; and even in such cases, although there be added traumatism and congestion produced by stone, stricture, gonorrhœa, or even tubercle; here, too, in the young and vigorous, even moderate care and cleanliness yield results in the main satisfactory; high grades of inflammation are not produced by careful instrumentation, and ascending pyelitis is wholly exceptional. But in these cases a muscularly healthy bladder is presumed to exist, one capable of demonstrating, by frequently and entirely emptying itself, the value of Guyon's maxim, "The bladder is the guardian of the ureters."

But how does the picture change when in waning life, be it premature or in the fulness of time, the nerve force fails, the bladder loses its expulsive tone, its muscular wall becomes replaced by tissue more or less fibrotic, crowding out and atrophying the muscular fibre, when there is more or less residual urine, when the ureters are dilated. Now let there be occasion for the use of any instrument in the bladder, and it requires often the utmost skill and attention, with all the asepsis and antisepsis which we can command, to avert septic conditions which readily climb the ureter through the door thrown open by previous preparation of the soil, and, producing the true surgical kidney, terminate the life of the patient, positively by reason of the surgeon's interference. Here the soil is rich and ready for the seed—the surgeon plants the seed in the urine, until then clear, and the patient reaps the harvest.

The physical soil is prepared by anything that weakens the bladder, congests or bruises its surface. Thus all antecedent conditions of disease for which the aid of the surgeon is invoked—stricture, prostatic enlargement, stone, tumor, retention—prepare the soil more or less, and it behooves the surgeon to be watchful about sowing the seed.

Turning again to the experimental field, let us study briefly the effect of the most active of the causes which prepares the way for kidney invasion from below. This cause is retention of urine or bladder tension, anything that interferes with the free and perfect passage of the urine downward from the kidney.

James has determined by experimentation the normal urinary pressure within the ureter to be about two and one-half centimeters of mercury, and Hermann has shown that a pressure of six centimetres almost suppresses the urea in the urine. Guyon, Albarran and others, have proved by experiment upon animals, that sudden closure of the ureter does not lead to a distention of this canal. The kidney does become distended, then some of its contents are reabsorbed, next the kidney undergoes atrophy. This circumstance caused Guyon to suggest that when the ureter was accidentally severed in some abdominal operation, the duct should be ligated aseptically and the kidney left to atrophy, thus saving the patient a needless nephrectomy. The kidney will not suppurate. Crooke found this atrophy of the kidney to have taken place in a female where the ureter had been aseptically occluded by a cyst of the broad ligament. The ureter was not dilated.

All this question of the effect upon the kidney of rapid closure of the ureter and of the slower process of obstruction below has been experimentally elucidated by Guyon upon dogs.[1] Absolute aseptic ligature of the ureter leaves the duct unaltered, causes dilatation, then atrophy of the kidney, the papillæ becoming flattened, the tubes dilating, the kidney substance getting sclerotic, and then withering. Tension in the kidney at first increases quickly, as shown by the mercurial manometre, to 40 millimetres in twenty minutes, and to 73 in an hour, dropping again swiftly to 44 millimetres in four and a half hours. After twenty-six days it bebecomes 11 millimetres, and after sixty-two days 3 millimetres, which is about what James has shown to be the normal pressure.

When, however, the obstruction is less acute, as when the urethra is ligated, polyuria is a first result, with a progressve diminution in the quantity of urea contained in the urine, shown by the fact that the urine in the bladder always contains more urea than that taken from the ureters, the latter more than can be obtained from urine found in the pelvis of the kidney, circumstances which go to prove three things: first, that the dilatation of the ureter takes place from above downward; second, that the diminution in the secretion of urea is progressive, and third, that regurgitation of urine does not take place; what was first excreted goes to the bladder, the last remains in the kidney. In vesical hæmaturia from acute retention of urine the fluid in the ureters remains pale, that in the bladder being bloody.

The slowly progressive dilatation of the ureter from above downward, and not from below upward, is admirably brought out in the thesis of Hallé.

In some cases of stricture, when the vesical muscle continues powerful, it is probable that the ureters are forced, because their orifices are found widely dilated, but in most instances, and notably in the case of thin-walled, weak bladders, or in thick-walled, sclerosed, weakened bladders, where there is atony, the ureter, although widely dilated, has a very small vesical orifice. Moderate obstruction below to free urinary outflow, even painful vesical spasm, is believed to be capable of leading to dilatation of the ureters, and of causing the renal changes incident thereto, changes which make the kidney resemble a senile organ, and prepare it fully for microbic invasion.

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[1] Experiments conducted by Allbaran and Chabrié.

A difference, however, is here. In the senile organ, partly atrophied and partly sclerosed as it is, there is an abasement of function. A number of observers agree upon this point. I may cite notably the thesis of Pierre Roche, who concludes that in the aged the quantity of urine is reduced one-sixth, the phosphoric acid is diminished by two-thirds, urea by one-half, chlorides unaltered, density about normal.[1]

Such abased function is not found in the kidney damaged by gradual chronic overdistention. Here there is an irritative element. Polyuria, very active polyuria, worse at night, is the rule. Ultzmann makes polyuria a constant sign of chronic pyelitis; and Oppolzer has even gone so far as to say that many cases of diabetes insipidus are only instances of chronic pyelitis unrecognized.

I personally look upon this sign, polyuria, in an old man, with ever-increasing respect. An individual with this symptom markedly present I consider the worst of all possible risks in case of operation. I greatly prefer to operate upon the bladder of a man having intense suppurative pyelitis on both sides, whose urine is full of casts and loaded with albumin, and I expect him to get well after a serious operation with much more hope than I do a patient having clean, light, thin urine, containing no albumin, or only a trace, and either no casts or only an occasional hyaline one, but who presents this symptom, polyuria, to a marked extent.

Cases therefore suffering from the results of slow prolonged obstruction below, and with dilated ureters, be their condition due to stricture, prostatic disease, stone, or old age, are subjects ripe for suppurative infection of the kidney, brought on either spontaneously by a mounting upward of the microbic infective agent from below in the natural course of progressive suppurative disease unrelieved by treatment, or by an implantation of the seed through the instrumentality of the surgeon.

For although the dilatation of the ureter takes place from above downward, yet after it has occurred, micro-organisms introduced into the bladder, and even particles of inert solid matter so introduced, shortly find their way upward, and may be recovered in the pelvis of the kidney, as has been demonstrated at the hands of several investigators. Inorganic matter, such as coal-dust, mounts slowly; organic matter (micro-organisms) rapidly.

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[1] Roche, following Bouchard, puts the daily average secretion of urine in old age at 1350 grammes, Rayer at 1824 c.c., Becquerel at 1267, Vogel between 1400 and 1600, Gubler between 1200 and 1500, Hepp at 1500. Beigel at 1320, Ballet from nineteen observations (150 tests) at between 500 and 800 grammes, his patients being from 70 to 86 years old. Therefore, polyuria is not a natural condition in old age. Its existence means disease. Albumin is not a normal ingredient of the urine of old age.

The deductions to be drawn from this brief summary of facts are roughly:

1. To use reasonable care in exploring a healthy bladder or passing any instrument into it.

2. To use greater care if there be traumatism from stone, tumor, stricture, especially if the powers of the individual be weakened by age or disease.

3. To exercise every known precaution in exploring and manipulating, instrumentally, cases of dilated bladder in a fibrotic state, with enlarged ureters and damaged kidneys.

Part II.—Practical Application of this Résumé.

I now reach the practical question: *How* shall the kidney be guarded? —for prophylaxis is more than cure—a kidney once in positive *chronic* suppuration does not get well. Acute suppurative cases very often die; less active ones suppurate indefinitely, and, eventually kill, by the process of urinary cachexia, so-called, in most instances.

The ends to be kept in view are (1) to avoid all unnecessary traumatic violence, and (2) to maintain asepsis, particularly, when the urine is clear, and more especially so when there is a weak bladder, residual urine, and dilated ureters.

When the bladder and kidney are already in chronic suppuration the indication is to attempt to destroy micro-organisms by direct antiseptic applications below, and to sterilize the urine by medicines from above. This means an attempt at asepsis in instrumentation, antisepsis in topical and in internal medical treatment.

Although these ends may be aimed at, none of them can be absolutely reached clinically;[1] for let instrumental asepsis be carried even to perfection, yet the pendulous urethra harbors a multitude of germs, some of them pathogenic; and this anterior urethra cannot by any known process be absolutely clarified; therefore, be the instrument ever so clean, it may push some noxious germ before it into the bladder, where finding proper pabulum, it may multiply to the patient's discomfort; in this way the victim being, as it were, "hoist by his own petard." Fortunately, the surgeon can kill this germ, and often Nature can dispose of anything short of massive infection.

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[1] Nor are all persons equally susceptible, moderate interference producing chill in one, when another, apparently in a more receptive condition, escapes entirely. Thomson, a medical missionary, states that among the Chinese urethral fever is unknown. Stricture and vesical calculus, he thinks, are more common in the province of Kwang-Tung than anywhere in the world, and in the hospital sounding and catheterism are practised daily, yet, he says, "In not one single case have I observed the fever that is so frequently concomitant to similar operations in Great Britain." He ascribes this to Chinese phlegmatic temperament, and apparently uses no preventive precautions.

On the other hand, it is absolutely impossible to disinfect a bladder in chronic suppuration by any antiseptic irrigation, since many of the micro-organisms lie concealed, imbedded in the cells, protected from the action of the antiseptic lotion. Finally, medicines acting through the stomach do not effectively destroy micro-organism in the kidney—although they help in the main issue.

But shall we on account of these rebuffs fold our hands placidly and let Nature struggle unaided? By no means. Indeed, we can do very much, in a helping way, as daily experience attests. With modern methods it is nearly possible to do away with urethral and urinary fever. An old prostatic with thin bladder, clear urine, atony, dilated ureter, and damaged kidney, may be so handled as to escape catheter fever entirely, and to emerge into catheter life with sparkling urine and no pyelitis.

How shall this end be attained? The complicated methods of asepsis which have been advocated cannot endure; they must be made simple to become generally adopted. Machines for forcing sulphurous acid fumes or steam through catheters are well enough for specialists and special occasions, but they cannot be broadly applied. Boiling water (or dry heat for solid instruments), bichloride of mercury or nitrate of silver, 1 in 1000, are all that is required. Woven instruments should be discarded as far as possible on account of the difficulty of keeping them clean. All instruments after use should be subjected to boiling water, hollow instruments injected with alcohol before use and soaked for an hour in bichloride or twenty minutes in nitrate of silver solution.

But it is not essential, except on special occasions, to use all these precautions. For an operation or a first exploration in an aseptic case they are essential. It is all-important always to avoid traumatic violence as far as possible. This factor, according to my experience, is more important than very high class asepsis. Moreover, in the young and healthy, simple cleanliness may suffice; in the old and feeble asepsis and antisepsis are essential. Then, again, in the great majority of those in whose behalf instrumentation is called for, chronic suppuration already exists, and it is hardly logical to strain at attempts to avoid befouling a pool which is already defiled. Therefore, simple but perfect cleanliness (hot water) and the avoidance of traumatism are enough in most instances, except when an operation is to be performed, an exploration to be made, or catheter-life started upon a patient whose residual urine is clear. Here rigid asepsis and antisepsis are desirable. I have no respect for that minute detail sometimes advocated which counsels a bichloride towel and disinfection of the meatus for every simple passage of the sound, and strives to render an old man's catheter life still more intolerable by forcing him to sterilize a number of catheters, to keep them in glass tubes stopped with cotton, and to disinfect his meatus at every instrumentation. Few old men will or can continue to do this, nor is it necessary.

I see no advantage in sterilizing or borating vaseline or glycerin. I had cultivated some vaseline taken from a pot in use for twenty years. This pot had never been disinfected or sterilized or its contents medicated in any way. It had been wiped out when empty, refilled from a supply can, and kept generally covered. I had some glycerin similarly cultivated. It was taken from a bottle never sterilized or medicated in any way, and in use for many years for catheter, cystoscope, and endoscope. These specimens yielded on cultivation only some ordinary air species of germs—nothing pathogenic.

The method of instituting catheter life which yields me all the satisfaction I require is the following: A rubber catheter is kept constantly in a 1 in 4000 bichloride solution and washed in very hot water after each use. Simple glycerin is the lubricant. The anterior urethra is to be flushed as the catheter enters for the first time, and all the way in through the membranous and prostatic urethra, with a 1 in 4000 bichloride solution. The urine is to be entirely but *very slowly* drawn off (watching the pulse), the patient being recumbent. The bladder is then to be immediately washed out with a 1 in 1500 (sometimes 1 in 2000, if the stronger causes too much pain) nitrate of silver solution, which usually occasions moderate temporary tenesmus. The bladder may then be washed out with a 6 per cent. salt solution (heaping tablespoonful to the quart), this to be drawn off, and such quantity of a weaker salt solution (teaspoonful to the quart) introduced and left in as the surgeon may think best.

The clean catheter, taken out of its bichloride solution and rinsed in hot water, and the salt solution, are to be used as often as any catheter is called for—further urethral flushing being a matter of personal judgment—the nitrate of silver repeated every one, two, or three days.

With such simple precautions catheter life may be safely instituted without implicating the kidneys, and often (unless the bar at the vesical neck bleed from being bruised) with (practically) an absence of pus in the urine, and this goes on until the tissues become hardened, when a non-disinfected catheter may be safely used, if simply kept clean.

When an operation is to be performed the urine is usually already purulent. In this instance it is better, and it has become almost a routine matter with me, to flush out the entire urethra and bladder before the operation with a salicylic acid solution followed by a 1 in 3000 or 4000 bichloride solution (this after the anæsthetic has been administered), and to follow the operation by a flushing out with a nitrate of silver solution, 1 in 1000; finally, and in subsequent washings for cleanliness, using about a 6 per cent. solution of common salt in hot water, and such strengths of mercuric or argentic irrigation as seem called for.

I have discarded Thiersch's solution and boric acid for the same reason, difficulty of prompt preparation. If the Thiersch solution be made on the spot (salicylic acid, ʒss; boric acid, ʒiiiss, in powder, added to a quart of hot water, is near enough to the formula) it dissolves slowly. If the cold solution has to be heated it is troublesome. Boric acid also dissolves slowly, and the bacteriological experiments soon to be detailed show that it is no more effective in killing germs than is salt and water. Now salt dissolves at once, and it is more cleansing than simple water, therefore I use it; and salicylic acid besides being an admirable germ-killer, as the bacteriological tables will show, has the extra advantage, first pointed out by Bryson, of St. Louis, of penetrating further and cutting deeper into the thick cohesive muco-pus of chronic catarrhal inflammation than any other substance. Therefore I have had made a solution of salicylic acid in alcohol, eight grains to the ounce. The bacteriological tables show that one-half grain salicylic acid to the ounce is as effective a germ-killer as Thiersch's solution, consequently, by adding one ounce of my alcoholic salicylic acid solution to a pint of hot water, I have a mixture promptly made and as effective as that of Thiersch.

These are the solutions, and this the routine method upon which I rely for avoiding kidney complications when surgical interference upon the bladder is called for.

Medicines to affect the urine and the flushing of the kidney by diluent waters—adjuvants of no mean value in keeping down kidney complications and moderating them when they exist in a chronic form—I shall speak of after I have detailed the result of the bacteriological work, which forms an essential part of this study.

Part III.—The Bacteriological Study.

In order to investigate the bacteriological side of this question of kidney and bladder infection, with consequent suppuration, and to see what confirmation or dissent would be furnished to the conclusions which clinical observation justified, I determined to institute a rather extensive series of experiments, and obtained the co-operation of Dr. E. K. Dunham, Professor of Histology, Bacteriology, and Hygiene in Bellevue Hospital Medical College, a gentleman whose position insured his disinterestedness and capacity. I selected nearly all the substances I was accustomed to use either for local application or through the stomach, and asked him to determine their relative destructive power, if any, upon pure cultures of staphylococcus pyogenes aureus, of streptococcus pyogenes, and of bacterium coli commune. I incorporate his tables and his remarks as to the process employed.

The substances chosen to be experimented with[1] are the following:

1. 1 in 1000 mercuric bichloride.
2. 1 in 2000 " "
3. 1 in 3000 " "
4. 1 in 4000 " "
5. 1 in 5000 " "
6. 1 in 10,000 " "
7. 1 in 500 argentic nitrate.
8. 1 in 1000 " "
9. 1 in 2000 " "
10. 4 per cent. solution of boric acid.
11. 10 per cent. solution of common salt.
12. 20 " " " "
13. 30 " " " "
14. Thiersch's solution.
15. Acid salicylic, gr. ss; alcohol, ʒss; water, ℥j.
16. Marchand's peroxide of hydrogen, 1; water, 3.

All these were to be tested for various lengths of time. Vaseline also was furnished from a pot not prepared, not disinfected in any way, and in common use for many years, and common glycerin from a bottle which had been in use for many years.

I supplied also many medicated urines. I selected two individuals in apparent good health whose conduct I could control. They took the same medicine at the same time, and at intervals of about four days specimens marked A, B, A1, B1, etc., were sent to the laboratory for investigation, Dr. Dunham being at the time ignorant of the kind of medicine that was being experimented with.

I was guided as to my interval of time between the tests by observing that the greenish-blue color imparted by methylene-blue to the urine, being most dense about eight hours after the drug was swallowed, practically disappeared during the fourth day, although faintly visible upon the fifth—an overlapping that could not be important. About five thousand examinations in all were made.

Report on a Series of Experiments to Determine the Value of Certain Solutions as Germicides, made for Dr. E. L. Keyes in October and November, 1893, by Edward K. Dunham.

The solutions experimented with were, first, solutions of chemical substances made of definite strength, distilled water being used as a solvent; second, samples of urine from healthy individuals after the exhibition of certain drugs.

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[1] I did not test potassium permanganate or carbolic acid, as I very rarely use them.

The bacteria used to test the germicidal value of these solutions were: Staphylococcus pyogenes aureus, streptococcus pyogenes, and bacterium coli commune. The cultures used were either vigorous cultures in bouillon grown in the incubator at a temperature of about 36° C. about twenty hours, or a similar culture upon agar-agar, cultivated at the same temperature for the same length of time.

The experiments made can be divided into two groups, which were designed in one group to favor the action of the substances in solution by bringing them into the most intimate contact with the bacteria experimented on; while in the other group of experiments an attempt was made to favor the bacteria by necessitating the penetration of the solution through a thin layer of bacterial growth before contact with all the bacteria could be effected. The details of the procedure were as follows:

GROUP I. Five cubic centimetres of the solution, or urine, were introduced into a sterile test-tube by means of a sterilized pipette. One drop of the twenty-hour bouillon culture of the bacterium was then introduced and the mixture well shaken. One loop (*circa* one drop) of the mixture was then removed after a definite interval of time, and either introduced into a tube of melted gelatin which, after mixing its contents, was placed in a horizontal position until the gelatin had solidified, or the loop of the mixture of solution and bouillon culture was distributed over the surface of agar-agar solidified obliquely in a test-tube. The growth which took place in the gelatin or agar tubes was then observed and recorded.

GROUP II. A series of test-tubes in which agar had been solidified obliquely were inoculated with the bacteria to be experimented upon, and placed in the incubator for about twenty hours. Into these tubes enough of the solution or urine to be tested to completely cover the growth of bacteria was poured. After a given length of time the solution or urine was poured off, the layer of growth washed with about ten cubic centimetres of sterile bouillon, and then either a gelatin tube or an agar tube inoculated with some of the growth remaining in the tube. On successive days the original agar tubes, the bouillon with which they were washed out, and the gelatin or agar tubes inoculated from them, after the washiug with bouillon were all examined for evidence of growth and amount of growth, and the results recorded.

The urine received for use in these experiments was not free from living bacteria. It, therefore, was necessary to make sure in each case that the growth of the various culture tests were of the species intentionally experimented upon. In the case of the staphylococcus pyogenes aureus a simple inspection of the growth upon agar was deemed sufficient to decide this point. In the case of the streptococcus the growth was examined in hanging drops, and if the coccus chains containing the individual cocci of the proper dimensions were observed a positive result was recorded. As a matter of fact, the growth when present was in nearly all cases sufficiently typical to leave no room for doubt as to the identity of the species. To test for the presence of living bacterium coli commune, gelatin cultures were chosen, and if white non-liquefying colonies of proper size, accompanied by gas production developed, the result was recorded as positive.

Some of the mixtures were allowed to stand for the specified time at the temperature of the room, which varied from 65° F. (16° C.) to 72° F. (22° C..)

EXPERIMENTS WITH CHEMICAL SOLUTIONS AND MEDICATED URINES.

o	no growth.
x	slight growth.
xx	moderate growth.
xxx	considerable growth.
xxxx	vigorous growth.
†	Test defective.

Solution used.	Bacterium.	Group I. Time of exposure, and result.				Group II. Time of exposure, and result.			
		2 min.	10 min	1 hr.	24 hrs.	2 min.	10 min	1 hr.	24 hrs.
Mercuric chloride, 1 in 1000	Sta. p. a.	o	o	o	o	x	x	o	o
	Strep.	o	o	o	o	o	o	o	o
	Coli.	o	o	o	o	o	o	o	o
1 in 2000	Sta. p. a.	x	x	o	o	x	x	x	o
	Strep.	x	o	o	o	o	o	o	o
	Coli.	o	o	o	o	xxxx	xxxx	x	†
1 in 3000	Sta. p. a.	xx	x	†	o	x	x	x	o
	Strep.	o	o	o	o	o	o	o	o
	Coli.	x	x	o	o	†	xxxx	xxxx	†
1 in 4000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	†	†	†	o
	Coli.	o	o	o	o	†	†	†	†
1 in 5000	Sta. p. a.	x	x	x	o	xxxx	xxxx	xxxx	†
	Strep.	†	†	o	o	o	o	o	o
	Coli.	x	x	x	o	xxxx	xxxx	xxx	†
1 in 10000	Sta. p. a.	xxxx	xxx	xx	o	xxxx	xxxx	xxxx	xxx
	Strep.	o	o	o	o	xxxx	xx	xx	x
	Coli.	o	o	o	o	xxxx	xxxx	xxx	xx
Argentic nitrate, 1 in 500	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	†	†	†	o
	Coli.	o	o	o	o	xxxx	xxxx	xxxx	†
1 in 1000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	†	o	o	xxxx	xxxx	xxxx	†
	Coli.	o	o	o	o	xxxx	xxxx	xxxx	†
1 in 2000	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	xxx
	Strep.	o	o	o	o	xxx	xxx	xxx	o
	Coli.	o	o	o	o	xxxx	xxx	xxx	xx
		1 min.	2 min.						
Mercuric chloride, 1 in 4000 at 98° F.	Sta. p. a.	x	x						
	Strep.	o	o						
	Coli.	x	o						
Argentic nitrate, 1 in 1000 at 98° F.	Sta. p. a.	o	o						
	Strep.	o	o						
	Coli.	o	o						
		2 min.	10 min						
Boric acid, 4 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	†	o	o	xxxx	xxxx	xxxx	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
Sodium chloride, 10 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	x	o	o	xxxx	xxxx	xxxx	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
20 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	†
	Strep.	xxxx	xxxx	o	o	xxxx	xxxx	xxxx	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
30 per cent.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
	Strep.	xxxx	xxxx	o	xxxx	xxxx	xxxx	xxxx	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	†
Thiersch's solution,	Sta. p. a.	x	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coli.	o	o	o	o	xxxx	xxxx	xxxx	†

Solution used.	Bacterium.	Group I. Time of exposure, and result.				Group II. Time of exposure, and result.			
		2 min.	10 min	1 hr.	24 hrs.	2 min.	10 min	1 hr.	24 hrs.
Salicylic acid, ½ gr. in 1 oz.	Sta. p. a.	o	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coli.	o	o	o	o	xxxx	xxxx	xxxx	†
Marchand's peroxide of hydrogen, 25 per cent.	Sta. p. a.	x	o	o	o	xxxx	xxxx	xxxx	†
	Strep.	o	o	o	o	xxxx	xxxx	xxxx	†
	Coli.	x	o	o	o	xxxx	xxxx	xxxx	†
Unmedicated urine, A[1]	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	†	†	†	†	†	†	†	†
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.I. 6 grs. methylene blue in 8 hours = 18 grs. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	†	†	†	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.II. 30 grs. salol in 8 hours = 90 grs. in 24 hours	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.III. 30 grs. boric acid in 8 hours = 90 grs. in 24 hrs.	Sta p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.IV. 30 m. wintergreen oil in 8 hrs. = 90 m. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.V. 12 grs. saccharine in 8 hours = 36 in 24 hours.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	x	xxxx	xxxx	xxxx	xxxx
B.V. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.VI. 15 grs. benzoate of soda in 8 hrs. = 45 grs. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	o	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xx	xxxx	xxxx	xxxx	xxxx
B.VI. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	x	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
A.VII. 50 m. oil of eucalyptus in 8 hrs. — 150 in 24 hrs.	Sta. p. a	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	x	†	xxxx	xxxx	xxxx	xxxx
B.VII. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	o	†	xxxx	xxxx	xxxx	xxxx
A.VIII. 20 m. sandal wood oil in 8 hrs. — 60 m. in 24 hrs.	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	†	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
B VIII. Same as above	Sta. p. a.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
	Strep.	xxxx	xxxx	o	†	xxxx	xxxx	xxxx	xxxx
	Coli.	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

OBSERVATIONS ON SAMPLES OF GLYCERIN AND VASELINE.

One cubic centimetre introduced into gelatin yielded in one case a single colony of bacteria of a common air species, in another case two colonies. It seems most likely that these gained access to the gelatin during the manipulations necessary to prepare the mixture. The cultures were kept under observation for ten days.

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[1] A only tabulated unless B differs in result.

Agar tubes were inoculated with small quantities of vaseline and placed in the incubator at 36° C. for several days. No growth resulted.

It appears, therefore, that the glycerin and vaseline were probably free from viable bacteria.

It will be noticed that in these numerous experiments clinical conditions have been imitated. In Group I. recent infection is simulated—*i. e.*, inoculation, the germ having been carried in by an instrument and lying free in the bladder, exposed to the most advantageous attack by the antiseptic. In Group II. the tissue involved in chronic inflammation is imitated, one layer of germs protects another. In actual life the tissue elements and tenacious mucus form a much better protective cover for the germs than could be well imitated in the laboratory. And it turns out scientifically, as it is proved to be practically, that the same reagent perfectly effective in Group I. is practically inert against the same germs in Group II.

This explains why by local treatment alone we may from the first avoid producing local suppuration, yet we cannot arrest local suppuration once started except by long-repeated effort, sometimes not at all. A glance at the first table also shows that while argentic nitrate is much more reliable than anything else in Group I.—bichloride is more reliable in Group II.—as might *a priori* have been inferred. The argentic nitrate coagulates the surface and protects the deeper germs, the bichloride solution has more penetrating power, and is, therefore, the more reliable the deeper the germ is situated.

The tables show mercuric bichloride up to 1 : 4000 to be absolutely effective (apparent deviations being doubtless due to errors of method and contamination) in Group I., while nothing less than 1 : 1000 can be depended upon in Group II., where the micro-organism has half a chance, and buried among the cells of a chronically inflamed mucous membrane the micro-organism surely has much more than half a chance.

Argentic nitrate up to 1 : 2000 is fully effective in Group I., entirely unreliable in Group II. In a comparative test nitrate of silver 1 : 1000 is better than mercuric bichloride 1 : 4000.

Boric acid is worthless in both groups, and so is salt up to a 30 per cent. solution.

Salicylic acid one-half grain to the ounce, Thiersch's solution, Marchand's solution, 1 part to 3 of water, are all reliable in Group I., useless in Group II.

Some recent experiments by Ali Krogius and Sam Chedenius go to show that the staphylococcus resists mercurial preparations longer than streptococcus or coli commune; the latter resists nitrate of silver the longest, streptococcus the least of the three.

The medicated urines were experimented with as follows:

Two apparently healthy persons having clear urine took the same drug at the same hours on a given day. The next morning each urinated into a bottle without precautions, and the specimens marked A, B, etc., were sent for examination. They also were tested with the micro-organisms in Groups I. and II., just as the medical solutions had been tested. The substances used, with the doses taken and the hours were as follows:

A and B. Unmedicated urines.
A. I. and B. I. 2 grains methylene-blue at 2, 6, and 10 P.M., equivalent to 12 grains a day.
A. II. and B. II. 10 grains salol at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. III. and B. III. 10 grains boric acid at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. IV. and B. IV. 10 minims wintergreen oil at 2, 6, and 10 P.M. (ʒj in twenty-four hours).
A. V. and B. V. 4 grains saccharine at 2, 6, and 10 P.M. (24 grains in twenty-four hours).
A. VI. and B. VI. 5 grains benzoate of soda at 2, 6, and 10 P.M. (ʒss in twenty-four hours).
A. VII. and B. VII. 10 minims Sanders' oil of eucalyptus at 2, 4, 6, 8, and 10 P.M. (Lydston), 100 minims in twenty-four hours.
A. VIII. and B. VIII. 10 minims sandal-wood oil at 6 and 10 P.M. (40 minims in twenty-four hours).

These substances were selected because they all, except perhaps the saccharine and the oil of eucalyptus, about which I am ignorant as yet, have undoubtedly a positive influence in moderating suppuration in chronic cases of kidney and bladder disease if properly selected, yet none of them cure, unless, perhaps, when persistently used in moderate cases. In profound chronic disorder they are next to valueless.

As was to have been expected, therefore, these substances do not exhibit in the laboratory any influence upon the growth of micro-organisms inoculated upon them and properly cultivated. The germ grows just as rapidly as in the urine of the same individuals not medicated when treated in the same way. Group I. and Group II. are alike negative. There is a faint show of beneficial influence (as to Group I.) in the urines medicated by benzoate of soda, by oil of eucalyptus, and by sandal-wood, but it is very slight. I did not test naphthaline, extolled by Couremenos, as the dose required is impossible in most kidney cases.

A further set of experiments, too elaborate for detail here, were made by Dr. Dunham with ½ per cent., 1 per cent., and 2 per cent. solutions of phenol-sulphate of potassium—the salt which appears in the urine when salol is taken by the mouth. The result demonstrated clearly that while even a 2 per cent. solution did not kill those pathogenic bacteria which are the subjects of this study, yet even a ½ per cent. solution showed a marked, though not very great inhibitive, action on their growth.

I cannot terminate this study without here laying emphatic stress upon, and calling especial attention to, the value of abundantly flushing the urinary passages with bland mineral waters of the diluent variety, as a means of flooding out both pus cells and micro-organisms mechanically in many forms of chronic suppurative disease all along the urinary tract.

I know of no one single agent that possesses so much power for good. The enemy is decimated by this method of warfare and can be taken at a disadvantage. I refrain from speaking the names of the mineral springs that possess this power—and there are many of them—because the commercial spirit of to-day prostitutes such utterances.

The character of the mineral ingredient in the spring is not material. All that is required is that one may be able to stomach the water freely—to drink a gallon, two gallons a day, or more, and that the water shall not affect the bowels.

A number of such waters exist. Distilled water does not do the work, nor does rain-water. Ordinary clear spring-water fails. In selecting a mineral water it is only necessary to find a cheap one that may be consumed in vast abundance without a feeling of repletion—one that will pass rapidly through the kidney, having no influence upon the individual other than the diuretic one.

And in closing, I wish further to emphasize two prognostic points: one is the common error of believing that the presence of pus in the urine is capable of accounting for a considerable amount of albumin. One constantly hears this expression: "Albumin in the urine accounted for by the pus." Surely this is true of a trace of albumin—but only of a trace. An admixture of blood with the pus, or of blood-serum coming from an excoriated tumor in the bladder, or from an ulcer; this will account for albumin in quantity; but when there is no tumor, no stone, no ulcer in the bladder, there may be very considerable amounts of pus with barely a trace of albumin, and if under such physical conditions the amount of albumin be relatively large, it usually means pyelitis—implication of the kidney in interstitial or parenchymatous change, and by so much becomes a factor of importance in prognosis. Anything over ½ of 1 per cent. by *weight* of albumin in urine, however purulent—if there be no blood in the specimen, no tumor, no stone, no ulcer in the bladder—becomes a factor in the question of prognosis when the point of the expediency of an operation comes to be considered. These cases may be assumed to have already reached a degenerative stage, and the chances of lighting up surgical kidney by operative interference below are relatively great.

The prognosis is, however, not worse—not so bad—as it is in the case of sclerotic kidney, with dilated ureter, etc., those cases in which there is active polyuria, worse at night, clear or nearly clear urine, with only a faint trace of albumin, or none at all. Such patients, after operation, are apt to die intensely uræmic, passing quarts of urine, and sometimes with little or no fever.

I may briefly summarize my conclusions as follows:

1. Healthy urine is sterile.
2. Purulent urine is always microbic.
3. Microbic infection takes place from within the body by a number of methods in the course of disease; it is often brought about by instrumental manœuvres on the part of the surgeon.
4. A healthy organism and vigorous bladder may cope successfully with microbic invasion, and rid itself spontaneously, or with a little aid, of all damage arising therefrom—showing little or even no inflammatory response.
5. A suitable condition of the patient's soil is essential to the propagation and perpetuation of inflammatory phenomena upon the urinary tract—after microbic invasion.
6. This condition, intensified, by traumatism and physical weakness, notably of the degenerative variety, is most intense when there is vesical distention with atony, and when the ureters are dilated and the kidneys involved in the changes incident to tension below—namely, atrophy and sclerosis above, with or without surface catarrh.
7. Under these circumstances surgical pyelonephritis is most likely to declare itself as a result of microbic infection from below (occasionally from above)—in the course of suppurative disease or after operative interference.
8. Asepsis, antisepsis, and sterilization of urine are ends to be aimed at in genito-urinary surgery—but, like all other greatest goods, not yet attained in perfection. Much, however, can be done by local means in a prophylactic and curative way, little by internal medication, and possibly as much or more than by any other means by flushing the urinary passages with natural mineral waters.

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GASTRO-ENTERIC RHEUMATISM.[1]

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In his interesting description of nervous dyspepsia marked by an excess of hydrochloric acid in the gastric juice, Mathieu seems inclined (*Traité de Médecine*, vol. iii. p. 270) to ascribe the gastralgic and neuralgic pains of the disease to a local action of the excessive secretion upon the walls of the stomach. He recognizes the intimate relation between this morbid condition and neurotic and arthritic states of the body, but he does not sufficiently emphasize the fact that in many, if not in all such cases, we have to deal with a distinct and definite form of rheumatism that merits recognition and designation as rheumatic dyspepsia. This is just as much a local disorder of the nervous and glandular apparatus of the alimentary canal as rheumatic tonsillitis is a definitely localized manifestation of arthritic disease in the fauces, or as podagra is a local exhibition of gout in the feet. It is, accordingly, among members of the arthritic class of patients that this form of gastralgia and dyspepsia is encountered. It is in advanced life or among prematurely aged and exhausted subjects that this species of rheumatism is most commonly observed. Some of the worst cases occur among middle-aged ecclesiastics and other sedentary people with slender muscles, but with plenty of time and zeal for copulation, which for such persons constitutes the type of neuro-muscular excess. Some of these patients have suffered in earlier life with inflammatory rheumatism; some have had genuine articular gout; sometimes a tendency to obesity is evident; diabetes and polyuria occasionally appear. Premature whitening of the hair, early baldness, erythema, pityriasis, eczema, hemicrania, neuralgia, asthma, chronic bronchitis, lithiasis, various functional disorders of the kidneys, and varicosity of the hemorrhoidal, scrotal, and peripheral veins are of not infrequent occurrence. Sometimes the same patient exhibits a group of these diseases at once, or he experiences them singly and successively. Sometimes they are distributed among different members of the same family, so that while one is obese another will be diabetic, a third rheumatic, a fourth hemorrhoidal, and so on. But, with advancing years, the tendency to vague, wandering, neuromuscular manifestations of the diathetic vice becomes more pronounced and inveterate. The grave disturbance of comfort that is thus produced, and the intolerable mental anxiety that may be caused by failure to recognize the true character of the disorder, give to rheumatic dyspepsia an importance greater than is usually assigned to it in the ordinary textbooks and treatises on medicine. Thus, Eichhorst, in his description of diabetes, gives a summary of the symptoms of gastro-enteric rheumatism as sometimes present in the course of the glycosuric disease, but he does not seem to recognize its independent character as a concurrent manifestation of arthritism, and he enumerates its symptoms as a part only of the symptomatology of diabetes. I desire, therefore, to call attention to this particular form of rheumatism affecting the nerves of the alimentary canal, because it is the cause of a great amount of misinterpreted and, consequently, unrelieved suffering. Its painful paroxysms are experienced when the stomach is nearly or quite empty, several hours after taking food. They are therefore suffered toward noon or in the latter part of the afternoon, or during the night—usually after mid-

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